

A New Interdisciplinary Professional Degree Program: The Doctor of Plant Medicine

John L. Capinera

The crop consulting and agrochemical industries long have expressed concern that although academic programs in entomology, plant pathology, and weed science produce knowledgeable and skilled research scientists and teachers, such graduates are overly specialized (e.g., Tammen and Wood 1977, Bradshaw and Marquardt 1990, Ferguson 1990, Raun 1991). Members of the crop consulting and agrochemical professions typically solve plant production and protection problems that require multidisciplinary and interdisciplinary knowledge. Indeed, integrated pest management (IPM) specialists in all fields recognize the importance of other disciplines, but few university graduates actually receive comprehensive training in more than one traditional academic discipline.

Academic institutions sometimes are criticized for producing abundant staff for academic institutions but inadequate numbers of professionals who can diagnose constraints on plant production and recommend comprehensive solutions. Existing doctoral degree programs tend to be devoted to developing a high degree of knowledge in a specialized area of science. Although specialization may be appropriate for students desiring academic careers emphasizing research, these doctoral programs do not produce the broadly educated problem-solvers needed in some sectors of society. Are graduates of such traditional programs equipped to diagnose plant stress or to foster practical IPM? In too many cases the answer is no.

Why Does This Problem Exist?

Existing doctoral programs make significant demands on students. Modern doctoral programs in entomology, plant pathology, and weed science often include large amounts

requisite for academic employment also are interested in pedagogical courses or in gaining experience in teaching. The mean length of Ph.D. programs has surpassed 4 years in most institutions, as students seek to gain all the requisite skills for employment. Further compounding the problem is the apparent need for students to publish extensively before graduating. Thus, there is little time during the typical research-oriented doctoral program for students to develop expertise in the other related plant-protection disciplines. The multidisciplinary knowledge that is needed for a holistic approach to plant production and assessment of crop health often is lacking among recent graduates.

The Medical Profession Model

The medical and veterinary professions long have recognized that there are two types of graduates needed to serve society: the medical scientists who further the advances in physiological research and medical practitioners who diagnose and solve human and animal health problems. Thus, medical professionals typically obtain the research-based Ph.D. degree if they pursue a career in research, and an M.D., P.D., D.D.S., D.V.M., or similar degree if they practice human or animal medicine (Table 1). Entomology and related disciplines have attempted to serve their varied clientele not with two types of advanced degree programs but with a single research-oriented Ph.D. program. As already noted, some of the major employers of entomology, plant pathology, and weed science graduates question the wisdom of our traditional approach to educating students.

of course work in computer application technology, biochemistry, and molecular biology in addition to the disciplinary studies and research credits. Farsighted students who recognize the importance of teaching as a pre-



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Of course we can. Perhaps more relevant is the question: should we develop such a program? If we do, will students and employers be interested?

A New Approach to Doctoral Education

The University of Florida has developed a new integrated doctoral degree, the Doctor of Plant Medicine (D.P.M.). It is a 3-year professional degree program and, as implied by the name, the curriculum parallels the professional medical education programs. The program emphasizes entomology and plant

pathology but also includes weed science, nematology, plant nutrition, plant production, and related areas (Table 2). Research is not a requirement, but practical experience and internships are an integral part of the academic program. Of the 120 credits required for the degree, 30 are earned by hands-on experience. The 90 credits of

Table 1. Parallels in graduate and professional degrees in health-related sciences and professions

	Human health	Animal health	Pharmacy	Dentistry	Plant health
General education	B.S.	B.S.	B.S.	B.S.	B.S.
Lower research degree	M.S. in Anatomy & Cell Biology, and similar areas (See below under Ph.D.)	M.S. in Veterinary Medical Sciences	M.S. in Pharmacy	M.S. in Dental Sciences	M.S. in Agronomy, Botany, Plant Pathology, Entomology, Horticulture, Forestry, Plant Science, Soil & Water Science
Highest research degree	Ph.D. in Anatomy & Cell Biology, Biochemical and Molecular Biology, Immunology & Medical Microbiology, Neuroscience, Pathology & Laboratory Medicine, Pharmacy, Therapeutical Physiology	Ph.D. in Veterinary Medical Sciences, Infectious Diseases, Physiological Sciences	Ph.D. in Pharmacy	Ph.D. in Medical Sciences (Oral Biology or Materials Science)	Ph.D. in Agronomy, Botany, Plant Pathology, Entomology, Horticulture, Forestry, Plant Science, Soil & Water Science
Professional (practicing) degree (nonresearch)	Doctor of Medicine (M.D.)	Doctor of Veterinary Medicine (D.V.M.)	Doctor of Pharmacy (P.D.)	Doctor of Dental Medicine (D.M.D. or its synonym, D.D.S.)	Doctor of Plant Medicine (D.P.M.)
Title of practitioner	Physician	Veterinarian	Pharmacist	Dentist	Plant Doctor

graduate course work required by this program are a far greater course load than students normally acquire when enrolled in Ph.D. programs where research credits are the predominant (sometimes exclusive) emphasis. The objectives of the new program are to educate students in the maintenance of plant health, diagnosis of plant stress, and recommendation of solutions for plant health problems.

Is there a need for such a degree? We believe that graduates of the D.P.M program will be better equipped for solving plant health problems than will graduates of conventional Ph.D. programs. Graduates of the D.P.M. program will be employed in many occupations, including independent crop consultants; county and multi-county plant-protection specialists; federal and state plant-health regulators; IPM coordinators; technical representatives and sales representatives for agrochemical companies; and plant maintenance specialists for companies, mu-

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nicipalities, parks, and recreation areas. As part of the protocol for approval of the program, we submitted letters of support from numerous private-sector employers who were enthusiastic about hiring such broadly educated graduates. However, graduates may be suited particularly well for teaching at smaller academic institutions such as junior colleges, state colleges, and international institutions where broad knowledge rather than research expertise is highly valued.

Florida is suited particularly well to host such a new plant health program. With its subtropical climate, Florida is home to numerous insects and plant diseases throughout the year. Plant production is a major element of the state's economy; food and ornamental plant crops are produced extensively and tend to be high-value commodities that warrant extensive monitoring and management effort. The plant-maintenance industry is unusually strong, and the numerous golf courses, theme parks, hotels, and resort areas all require immaculate and

Table 2. Summary of course requirements for the Doctor of Plant Medicine Degree at University of Florida

Plant Science/Soils (Agronomy/Horticulture/Turf/Forestry): a minimum of 18 graduate course credits including courses in Crop Production/Management, Plant/Crop Physiology, Crop Nutrition, Weed Science, and Fertilizers and Soil Fertility.

Entomology: a minimum of 17 credits in the areas of Insect Classification, Immature Insects, Insect Ecology, Insect Toxicology, Biological Control of Insects, and Acarology.

Plant Pathology: a minimum of 18 credits in the areas of Fungal Plant Pathogens, Plant Bacteriology, Plant Virology, Epidemiology of Plant Disease, and Plant Disease Control.

Nematology: a minimum of three credits in Plant Nematology.

Pest Management: a minimum of three credits in Fundamentals of Pest Management.

Related Courses: a minimum of two credits in Wildlife Damage to Plants and two in Pesticide Regulations (Agricultural Law).

Campus-based methods/internship: two credits in the Insect Identification Laboratory, three in Plant Disease Diagnosis, three in the Plant Disease Clinic, two in the Nematode Assay Laboratory, and two in Field Techniques in IPM.

Total course credits required in program: 90

Total credits of required courses: 63

Credits available for elective courses: 27

Total internship credits required in program: 30

Campus-based internship credits: 12

Off-campus internship credits: 18

Total credits required in program: 120

ornate landscapes. Thus, there is unsurpassed opportunity for students to view plant-health problems, and to engage in experiential learning through work-study or internship programs.

This doctoral program at the University of Florida is the first of its kind, although faculty from several other institutions have indicated interest in establishing similar programs. Not everyone is enthusiastic about this nontraditional program. Perhaps, not surprisingly, the research-oriented faculty generally have not been enthusiastic supporters although the extension specialists grasped the significance and embraced the concept immediately. Faculty enthusiasm is not necessarily the key to the program's success, however. Success of the program likely hinges on the quality of students attracted to the program and the quality of the experiential learning program provided to the students. This is a rigorous academic activity, with students enrolled in 15 credits of graduate courses each semester.

Thus far, we have indications that the first class of 11 students, starting in the fall semester of 2000, will be highly qualified and will be entering from various prestigious B.S., M.S., and even Ph.D. programs. We expect that we will be equally pleased with the quality and success of the graduates. We anticipate that D.P.M. graduates will reflect well on the component disciplines through excellent service to plant producers, with these

plant-health practitioners building upon and complementing the research activities of Ph.D. graduates in the same manner as the dual doctoral degree programs of the medical profession.

Anyone interested in more information should consult the program's website (<http://www.dpm.ifas.ufl.edu/>) or contact the program director, George Agrios at 1453 Fifield Hall, University of Florida, Gainesville, FL 32611-0680 (e-mail: GNA@gnv.ifas.ufl.edu)

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John L. Capinera is professor and chairman of the Entomology and Nematology Department at the University of Florida, Gainesville. His interests are ecology and management of insect pests, particularly grasshoppers and vegetable pests.